

## RESEARCH NOTE

## Feeding grounds of the eastern South Pacific humpback whale population include the South Orkney Islands

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### Abstract

This paper reports on two photo-identified humpback whales (*Megaptera novaeangliae*) that were sighted in different years in the proximity of the South Orkney Islands, at the boundary between the Scotia and Weddell seas (60°54.5'S—46°40.4'W and 60°42.6'S—45°33'W). One of the whales had been previously sighted off Ecuador, a breeding ground for the eastern South Pacific population. The other whale was subsequently resighted in Bransfield Strait, off the western Antarctic Peninsula, a well-documented feeding ground for the same population. These matches give support to a hypothesis that the area south of the South Orkney Islands is occupied by whales from the eastern South Pacific breeding stock. Consequently, we propose 40°W as a new longitudinal boundary between the feeding grounds associated with the eastern South Pacific and western South Atlantic breeding stocks.

Humpback whales (*Megaptera novaeangliae*) migrate seasonally from high-latitude feeding grounds to breeding and calving grounds in the tropics (Dawbin 1966). In the Southern Hemisphere, seven humpback whale Breeding Stocks (A–G) and six management areas are recognized by the International Whaling Commission (IWC 1998). The western Antarctic Peninsula is a known migratory destination for Breeding Stock G (eastern South Pacific population; Stevick et al. 2004; Rasmussen et al. 2007), while South Georgia and the South Sandwich Islands, in the South Atlantic, have been linked to Breeding Stock A (western South Atlantic population; Stevick et al. 2006; Zerbini et al. 2006; Engel & Martin 2009). The IWC management boundary between the feeding grounds associated with these two stocks has recently been updated to 50°W (IWC 2011), after the biological significance of the previous 60°W division was contested

by several studies. However, there is still uncertainty about the degree of overlap and mixing between these two stocks, as currently available data suggest that the longitudinal boundary should be located further to the east (Dalla Rosa et al. 2008).

The South Orkney Islands lie on a submarine ridge between the South Shetland Islands to the west (occupied by Breeding Stock G humpbacks) and the South Sandwich Islands to the east (Breeding Stock A). More than 400 humpbacks were hunted around the South Orkneys during the early part of the 20th century (Hart 2006) and the species is occasionally seen in the area today, but the breeding region of these animals remains unclear.

In this paper we report on photo-identification matches of humpback whales between the South Orkney Islands and two locations west of 50°W: Ecuador, on the

north-western coast of South America, and Bransfield Strait, off the western Antarctic Peninsula.

## Methods

Fluke photographs of Southern Hemisphere humpback whales have been shared by several research groups and individual contributors to form the Antarctic Humpback Whale Catalogue (AHWC), an international collaborative project aiming to understand migratory connections and feeding-ground movements, both important information for stock assessment and management. The AHWC contained, as of 2010, a total of 3665 whales, of which 1368 were photographed on the feeding grounds—995 around the Antarctic Peninsula, including only three whales identified near the South Orkney Islands (Allen et al. 2011). Whales were individually identified from distinctive natural markings and permanent scars on the ventral surface of the flukes. All photographs were systematically compared following the model developed by Katona & Beard (1990), modified for use with electronic images (Allen et al. 2011).

## Results and discussion

Whale AHWC #0654 was first photographed on 14 September 1996 off Puerto Cayo, Ecuador ( $1^{\circ}20.15'S$ — $80^{\circ}50.63'W$ ). This individual was resighted 4.36 years later, on 25 January 2001, at  $60^{\circ}54.5'S$ — $46^{\circ}40.4'W$ , 56 km south-west of the South Orkney Islands (Fig. 1). Whale AHWC #0733 was first sighted on 31 December 1989 in Normanna Strait between Coronation and Signy islands, South Orkneys at  $60^{\circ}40'S$ — $45^{\circ}35'W$ , and resighted 7.99 years later (28 December 1997) near Livingston Island, Bransfield Strait ( $62^{\circ}42'S$ — $59^{\circ}51'W$ ; Fig. 1).

Despite the numerous photo-identification matches between Ecuador and the Antarctic Peninsula (see Stevick et al. 2004; Castro et al. 2008), the match reported here is the first between an eastern South Pacific wintering ground (Breeding Stock G) and a feeding area east of the Antarctic Peninsula and of the  $50^{\circ}W$  longitude.

The sightings of whale #0733 represent another record of exchange between the western Antarctic Peninsula and the South Orkneys region, and provide further evidence of whales crossing the  $50^{\circ}W$  longitude. One humpback whale that was satellite-tagged in Gerlache Strait, western Antarctic Peninsula, travelled eastward into the Weddell Sea to nearly  $50^{\circ}W$ , and possibly reached a sea-ice fringe further east before returning towards the Antarctic Peninsula (Dalla Rosa et al. 2008). Another humpback whale sighted at a longitude of

$38^{\circ}48.8'W$  in the Weddell Sea was resighted the following year at  $52^{\circ}51.1'W$  (Dalla Rosa et al. 2004, 2008). Together, the two matches presented in this paper support the hypothesis that the area south of the South Scotia Ridge and the South Orkney Islands, and west of about  $35^{\circ}W$  is occupied by whales from Breeding Stock G (Dalla Rosa et al. 2008). This hypothesis is also supported by the lack of photo-identification matches between the Weddell Sea and Abrolhos Bank, Brazil (Dalla Rosa et al. 2004)—the area of Breeding Stock A—and by the migratory destination and movements of satellite-monitored and photo-identified whales from Breeding Stock A that were confined to the feeding grounds near South Georgia and the South Sandwich Islands (Zerbini et al. 2006; Engel & Martin 2009; Zerbini et al. 2011).

Although sample sizes are small, it is clear that all available evidence coming from different sources point to the same conclusion. We therefore propose that the longitudinal boundary between the feeding grounds associated with stocks G and A be moved to  $40^{\circ}W$ . There is no evidence to indicate that the current latitudinal boundary of  $60^{\circ}S$  is incorrect.

We recommend further photo-identification, DNA sampling and satellite tagging effort in the Scotia Sea and Weddell Sea region to determine the degree of overlap and mixing, if any, of the neighbouring humpback whale populations. Individuals from Breeding Stock F have also been identified in the Antarctic Peninsula, indicating movement over large longitudinal scales (Robbins et al. 2011). As more data become available, a complex feeding ground structure may be found in the Weddell Sea, including the area of the Weddell–Scotia Confluence, as a consequence of variability in sea-ice extent and other factors such as prey availability, which could influence the seasonal distribution of whales.

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**Fig. 1** Locations of humpback whale photo-identification matches between the South Orkney Islands and Ecuador (north-western coast of South America) and Bransfield Strait (western Antarctic Peninsula). Breeding areas for the eastern South Pacific (Stock G) and western South Atlantic (Stock A) populations are represented in light grey.

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